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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER	
MALEVIC, DJURA	

ART UNIT	PAPER NUMBER
2884	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/799,444	TOLTON ET AL.	
	Examiner	Art Unit	
	DJURA MALEVIC	2884	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *11 March 2008*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-18 and 20-25* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-18 and 20-25* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *12 March 0204* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

In view of the appeal brief filed on 03/11/2008, PROSECUTION IS HEREBY REOPENED. See detailed action set forth below.

To avoid abandonment of the application, appellant must exercise one of the following two options:

(1) file a reply under 37 CFR 1.111 (if this Office action is non-final) or a reply under 37 CFR 1.113 (if this Office action is final); or,

(2) initiate a new appeal by filing a notice of appeal under 37 CFR 41.31 followed by an appeal brief under 37 CFR 41.37. The previously paid notice of appeal fee and appeal brief fee can be applied to the new appeal. If, however, the appeal fees set forth in 37 CFR 41.20 have been increased since they were previously paid, then appellant must pay the difference between the increased fees and the amount previously paid.

A Supervisory Patent Examiner (SPE) has approved of reopening prosecution by signing below.

Response to Arguments

Applicant's arguments see Appeal Brief filed on 03/11/2008, with respect to claims 1-18 and 20-25 have been fully considered and are persuasive. The previous rejections have been withdrawn. However, upon further consideration, a new ground(s) of rejection is made (See below).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1,2,5, 7, 11,12,13,15,16, and 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nelson et al. (US Patent 6,750,453 B1) in view of Sachse (US Patent 6,611,329 B2) .

With regards to claim 1, Nelson discloses a method of detecting gases in the free atmosphere comprising traversing a target area with a gas correlation radiometer (GCR) tuned to detect the presence of ethane and identifying a gas leak upon a gas filter correlation radiometer (Col. 4, Line 59; Col. 1, Line 30++; Col. 21, Line 62). Nelson further discloses that gas correlation radiometry (GCR) is generally a passive technique that relies on solar illumination, scattering or on thermal emission background (Col. 2, Line 30)(Col. 8, Line 35). Nelson goes on to teach a GCR comprising an active source, thus failing to expressly disclose detecting variations in solar radiation, i.e., utilizing passive source, reflected from the target area as claimed. Notice, passive GCR's are well known and conventionally used in the art.

Sachse shows passive correlation techniques utilizing solar radiation are known (Col. 4, Line 14). Therefore, it would have been obvious to one skilled in the art at the time the invention was made to modify Nelson to include solar radiation such as that taught by Sachse, since it was held that the selection of any of the known equivalents, i.e., a correlation instrument comprising either an active or a passive source, would be considered application specific and within the level of ordinary skill in the art. For

instance, the biggest advantage of a monitoring system comprising a passive source is that the said system can be used from the ground, a vehicle, an aircraft, and even satellite platforms. Therefore, long sections of pipelines can be monitored for natural gas leaks relatively easier. Additionally, since the source is passive, i.e., solar radiation, the correlation system is less expensive being that no external or active source is needed. Therefore, a correlation system such as that taught by Nelson in combination with a passive source, such as solar radiation, would have been recognized by one of ordinary skill in the art.

Notice, additional prior arts regarding passive GCR's are citied in the conclusion.

With regards to claim 2, Nelson discloses detection along the wavenumber 2970 to 3005cm^{-1}, thus discloses the claimed wavenumber of 3000cm^{-1} (Col. 21, Line 6).

With regards to claim 5, Nelson discloses a gas filter correlation radiometer (Figure 1) comprising: a window 63 in a housing; optics defining a first 78 and second 76 optical paths between the window 63 and the detectors 82 and 86; a beam splitter 72 as part of the optics for directing radiation from the window 63 and dividing the radiation between two optical paths; wherein said optical paths comprise a first ethane and a second ethane optical paths being different in lengths and electronics 88 and 89 for processing signals from the detectors 82 and 86.

With regards to claim 7, Nelson discloses detection along the wavenumber 2970 to 3005 cm^{-1}, thus discloses the claimed wavenumber of 3000cm^{-1} (Col. 21, Line 6).

With regards to claim 11, Nelson discloses an optical path provided with a gas filter containing ethane (Col. 10, Line 64++; Col. 21, Line 4; Col. 21, Line 62).

With regards to claim 12, Nelson discloses two optical paths with different lengths capable of detecting ethane (Col. 10, Line 64++; Col.21, Line 4; Col. 21, Line 63).

With regards to claim 13, Nelson discloses two detectors 82 and 86 having collocated fields of view and sampling synchronously (Figure 1), (Col. 21, Line 62).

With regards to claim 15, Nelson discloses mounting the correlation radiometer on an airborne vehicle (Fig 19).

With regards to claim 16, Nelson discloses the gas leak located along a pipeline and detection of gas leaks is carried only using ethane (Col. 1, Line 30++).

Claims 3 and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nelson and either Sachse in view of Hodgkinson (International Publication WO 01/94916).

With regards to claims 3 and 8, Nelson modified discloses a method of detecting gas leaks as claimed in claims 1 and 5, and further discloses that the gas filters are configured for ethane, such that the optimized central wavelength and the optimized band-pass provides substantially increased sensitivity to ethane gas and substantially increases selectivity of ethane gas. Furthermore, Nelson discloses that the said filter consists of a specific band-pass and central wavelength, which avoids erroneous detection of any competitive gases (other than ethane). The said filter responds to wavelengths with a band corresponding to strong absorption by the specific target gas (ethane). Moreover, Nelson discloses filters for ethane comprising a band of 2970 to

3005 cm^{-1} and a process for obtaining an ethane-optimal central wavelength to increased sensitivity to ethane as the target gas (Col.13, Line 61; Col. 21, Line 3; Col. 21, Line 62). Nelson does not expressly disclose the absorption peak at a bandwidth of 2850 to 3075cm^{-1}.

However, the absorption peak at a bandwidth of 2850 to 3075cm^{-1} is known in the art. For example, a reference such as Hodgkinson (International Publication WO 01/94916) shows an ethane absorption spectrum of 2815 to 3100 cm^{-1} (Figure 2). Thus, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify Nelson to include an absorption bandwidth such as that taught by Hodgkinson in order to increase captured signals which in turn provides additional sensitivity.

With regards to claims 4 and 9, Nelson discloses the claimed invention according to claims 1 and 5, but does not expressly disclose the gas filter correlation radiometer tuned to detect ethane using an absorption peak at a bandwidth of 150cm^{-1} above or below 3000cm^{-1}. However, any specific band would have been an obvious matter of design choice. Since it is known in the art that a wideband would lead to increased sensitivity by increasing the captured signals, it would have been obvious to one skilled in the art at the time the invention was made to include a bandwidth of 150cm^{-1} above or below 3000cm^{-1} to further the increase sensitivity of the detector as is well known in the art. Additionally, it has been held that where the general conditions of a claim are disclose in the prior art, i.e., Nelson and Hodgkinson both teach different bandwidths

similar to applicant claimed range, discovering the optimum or workable ranges involves only routine skill in the art.

Claims 6, 10, 14, 18, 20, 24 and 25, are rejected under 35 U.S.C. 103(a) as being unpatentable over Nelson and either Sachse in view of Jeon (US Patent 5,742,383).

With regards to claims 6, Nelson discloses the method of detecting gas leaks and a gas filter as claimed in claims 5, but does not expressly disclose the specific type of beam splitter claimed, i.e., bi prism. Notice, bi prisms are well known in the art. However, Jeon shows that partitioning may be accomplished in a number of ways including utilizing a bi prism, i.e., a beam splitter formed by two right angled prisms (Col. 3, Lines 30 -40). Thus, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify Nelson to expressly include a beam splitter comprising a bi prism such as that taught by Jeon, since bi prisms are known for partitioning light with great efficiency and thereby reducing light loss.

With regards to claim 10, Nelson discloses detection along the wavenumber 2970 to 3005 cm^{-1}, thus discloses the claimed wavenumber of 3000 cm^{-1} (Col. 21, Line 6).

With regards to claims 14, Nelson discloses the method for detecting gas leaks as claimed in claim 5 but does not expressly disclose using a pushbroom imaging technique. However, Nelson discloses detecting in a direction perpendicular to the ground surface while moving in an aircraft, thus it is obvious that Nelson is using a pushbroom technique. It is also obvious to utilize the pushbroom technique, since the

pushbroom technique detects simultaneously as the field of view changes in time and/or in placement.

With regards to claims 18, Nelson discloses a gas filter correlation radiometer (Figure 1) comprising a window 63 in a housing, optics defining a first 78 and second 76 optical paths between the window 63 and the detectors 82 and 86, a beam splitter 72 as part of the optics for directing radiation from the window 63 and dividing the light between optical paths, ethane optical paths being different lengths from each other and electronics 88 and 89 for processing signals from the detectors 82 and 86. However, Nelson does not expressly disclose the beam splitter comprising a bi-prism. Notice, bi prisms are well known in the art. Jeon shows that partitioning may be accomplished in a number of ways including utilizing a bi prism, i.e., a beam splitter formed by two right angled prisms (Col. 3, Lines 30 – 40). Thus, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify Nelson to expressly include a beam splitter comprising a bi prism such as that taught by Jeon, since bi prisms are known for partitioning light with great efficiency and thereby reducing light loss.

With regards to claim 20, Nelson discloses detection along the wavenumber 2970 to 3005cm^{-1}, thus discloses the claimed wavenumber of 3000cm^{-1} (Col. 21, Line 6).

With regards to claim 24, Nelson discloses a first optical path incorporating a gas filter containing ethane (Col. 10, Line 64++; Col. 21, Line 4; Col. 21, Line 62).

With regards to claim 25, Nelson discloses a second gas path length lower than first gas path length (Figure 1).

Claim 17 is rejected under 35 U.S.C. 103(a) as being unpatentable over Nelson and Sachse in view of Smith.

With regards to claim 17, Nelson modified discloses the method for detecting gas leaks as claimed in claim 1 but does not expressly disclose the gas leak detected as part of reservoir mapping process. Further Smith shows high-resolution maps exposing a distribution of gas leaks (Col. 3, Line 36) (Figure 1). Thus, it would have been obvious to a person of ordinary skill in the art at the time of the invention was made to modify Nelson to include the mapping system such as that taught by Smith because mapping gas leaks would increase the users understanding of the area being surveyed.

Claims 21, 22 and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nelson and either Butler, Sachse or Smith in view of Jeon and Hodgkinson.

With regards to claims 21, Nelson discloses a gas filter correlation radiometer (Figure 1) comprising a window 63 in a housing, optics defining a first 78 and second 76 optical paths between the window 63 and the detectors 82 and 86, a beam splitter 72 as part of the optics for directing radiation from the window 63 and dividing the radiation between optical paths, ethane optical paths being different lengths from each other, electronics 88 and 89 for processing signals from the detectors 82 and 86 and detection along the wavenumber 2970 to 3005 cm^{-1} (Col. 21, Line 6). Nelson does not expressly disclose the beam splitter comprising a bi-prism and an ethane absorption peak at a bandwidth of at least 2850 to 3075 cm^{-1}.

Notice, bi prisms are well known in the art. Jeon shows that partitioning may be accomplished in a number of ways including utilizing a bi prism, i.e., a beam splitter formed by two right angled prisms. Thus, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify Nelson to expressly include a beam splitter comprising a bi prism such as that taught by Jeon, since bi prisms are known for partitioning light with great efficiency and thereby reducing light loss.

Also, the absorption peak at a bandwidth of 2850 to 3075cm^{-1} is well known in the art. For example, a reference such as Hodgkinson (International Publication WO 01/94916) teaches an ethane absorption spectrum of 2815 to 3100 cm^{-1} (Figure 2). Thus, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify Nelson to include an absorption bandwidth such as that taught by Hodgkinson in order to increase captured signals which in turn provides additional sensitivity.

With regards to claim 22, Nelson discloses the claimed invention as claimed in claim 21 but does not expressly disclose the gas filter correlation radiometer tuned to detect ethane using an absorption peak at a bandwidth up to 150 cm^{-1} above or below 3000cm^{-1}. However, any specific band would have been an obvious matter of design choice. Since it is known in the art that a wideband would lead to increased sensitivity by increasing the captured signals, it would have been obvious to one skilled in the art at the time the invention was made to include a bandwidth of 150cm^{-1} above or below 3000cm^{-1} to further increase sensitive of the detector as is well known in the art.

Additionally, it has been held that where the general conditions of a claim are disclose in the prior art, discovering the optimum or workable ranges involves only routine skill in the art.

With regards to claim 23, Nelson discloses the claimed invention according to claim 21 but does not expressly disclose the gas filter correlation radiometer tuned to detect ethane using an absorption peak at a bandwidth of 150cm^{-1} above or below 3000cm^{-1}. However, any specific band would have been an obvious matter of design choice. Since it is known in the art that a wideband would lead to increased sensitivity by increasing the captured signals, it would have been obvious to one skilled in the art at the time the invention was made to include a bandwidth of 150cm^{-1} above or below 3000cm^{-1} to further increase sensitive of the detector as is well known in the art. Additionally, it has been held that where the general conditions of a claim are disclose in the prior art, discovering the optimum or workable ranges involves only routine skill in the art.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Bonne (US Patent 4,507,558) shows absorption of ethane at around 3000 cm^{-1}, with a large bandwidth, i.e., 300, that would not interfere with methane (Figure 2) (Col. 3, Lines 48 -59).

Sachse (US pub. 2004/0156050; US Pub. 20030206325; US Pub. 20030112435; and US Patent 5,128,797) all teach solar radiation as the passive source for a Gas filter

correlation radiometry. Additionally, Sachse teaches active sources such as lasers which shows that the selection of any of the known equivalents (i.e., active or passive source) just depends on the specifics of the application at hand.

Butler (US Patent 5,905,571) (see Col. 6, Line 38) and Smith (US Patent 6,756,592) (See Claim 1), both show solar radiation as the passive source for a Gas filter correlation radiometry.

Weimer et al. (US Patent 6,409,198) teaches the device of the instant invention is so accurate that it can be used to detect very small **amounts of certain gases in the atmosphere**, i.e., such as ethane in a gas leak, which is routine in the art. If atmospheric gases are at a different temperature than the background, then **radiometers** can be used to detect the presence of the gas by measuring this temperature differential. This means that **a passive system can be used to detect the presence of trace gases** in the air. To do this requires that the gas be of sufficient concentration, that it has sufficiently strong absorption bands, and that there is sufficient temperature contrast between the gas and its background. **One commonly used background scene is the sun.** The present invention could be used in making such a trace gas detection system.

Abe et al. (US Patent 6,829,051), figure 2 shows it is known to have a beam splitter comprising a bi-prism.

Drinkwater (US Patent 3,472,593), figure on cover, shows a beam splitter comprising a bi-prism.

Henningsen et al. (US Patent 5,946,095) shows a method of determining optimum frequencies for detecting a target gas, i.e., absorption lines. Henningsen teaches that absorption lines may be used from sources such as Hitran, a published paper form allied optics or collected with a spectrometer (Col. 9, Lines 19 -65).

Any inquiry concerning this communication or earlier communications from the examiner should be directed to DJURA MALEVIC whose telephone number is 571.272.5975. The examiner can normally be reached on Monday - Friday between 8:30am and 4:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Porta can be reached on 571.272.2444. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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